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SOME HAMILTON OSTRACODES FROM ARKONA, ONTARIO

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INTRODUCTION

The ostracodes described in this paper were collected by the senior author in 1930, from Marsh's Mill and Rock Glen, on the Ausable River, about one and one-half miles east of Arkona, in the southeastern part of Bosanquet Township, Lambton County, Ontario. The sample comes from the Coral Zone of the Widder Beds in the Hamilton Group, just above the Encrinal Limestone which separates the Widder Beds from the Arkona shale.

The Coral Zone is a bluish or gray shale or shaly limestone, abundantly fossiliferous. The Widder Beds, of which it is the chief fossiliferous member, are equivalent to the Ludlowville Formation of the Hamilton at Eighteen Mile Creek, New York. They possess a common fauna, which is also present in Michigan, in the upper part of the Alpena Limestone, in the Traverse Group.[2]

The ostracodes from the Coral Zone which are included in this paper are classified in 22 genera, 10 of which are new. There are 34 species, of which 24 are new. Two new families, the Ropolonellidae and Quasillitidae, are named and described here for the first time. They include an original list of four genera each.

Appreciation is due to Mr. Philip H. Jennings for helpful service in photography.

CLASSIFICATION AND DESCRIPTION OF THE OSTRACODA

Primitiidae Ulrich and Bassler, 1908

ULRICHIA JONES, 1890

Ulrichia spinifera, new species

Figures 1, 1a, 2

Carapace subrhomboidal; hinge line straight, about seven-eighths as long as the greatest length of the valve. Cardinal angles sharp, slightly obtuse. Ventral mar-

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[2] Stauffer, C. R., 1915, 'The Devonian of Southwestern Ontario.' Canada Dept. of Mines, Geol. Surv., Mem. 34, p. 10.

gin gently convex; ends rounded, with slight backward swing near the anterior. Free margin surrounded by a heavy false border with very small, regularly spaced, spinose papillae projecting from its outer edge. Surface of each valve within the thickened marginal ridge is flattened and ornamented with reticulations and two non-reticulate tubercles that extend above the hinge line, one near the center of the posterior half of the dorsal margin, and the other posterior to the center of the anterior half of that border. The anterior tubercle is sharper than the posterior one. Greatest height is located slightly anterior to the mid-height of the posterior half.

LENGTH.—0.74 mm. HEIGHT.—0.41 mm.

TYPES.—A. M. N. H. Cat. No. 24628.

This species is distinguished from *Ulrichia conradi* Jones, by its more elongate form, and by the presence of the conspicuous spinose papillations along the free margin.

BOLLIA JONES AND HOLL, 1886

Bollia widderensis, new species

Figures 4, 4*a*

Carapace subovate; hinge line straight, with obtuse cardinal angles. Ventral margin broadly convex; anterior margin broadly rounded both dorsally and ventrally, forming a medially protruding central portion; apparently a slight backward swing anteriorly. Posterior end rounded with higher, smaller arc, more protruding. Shell apparently thick, the thickness increasing toward the ventral margin. The submedian sulcus, which is located slightly posterior to the center of the valve, is bounded by a U-shaped ridge, broad anteriorly and narrow posteriorly. The anterior and posterior limb of the ridge each ends in a blunt, broad-based, dorsal cone. The anterior cone is round in cross section and rises higher and is more acute than the posterior one, and it is as wide as the ridge. The posterior cone is more lobe-like, with an oval base which has its longer axis nearly normal to the hinge line. This lobe is wider than the U-shaped ridge and joins it on its posterior edge. This makes the median sinus curve backward around the ventral edge of the lobe. The U-shaped ridge is separated ventrally from the rest of the valve by a depression that is deep, and equal in width to the width of the ridge posteriorly. As it approaches the anterior, the groove becomes increasingly narrow and more shallow, so that the anterior limb of the U-shaped ridge is almost flush, along its outer margin, with the anterior two-fifths of the valve. Surface of carapace is coarsely papillose. Greatest height is located two-fifths of the length from the anterior end; greatest convexity is postero-ventral.

LENGTH.—1.59 mm. HEIGHT.—0.91 mm.

TYPES.—A. M. N. H. Cat. No. 24627.

Bollia widderensis is more elongate than *Bollia hindei* Jones.

Bollia hindei Jones, 1890

Figure 3

JONES, T. R., 1890, Quart. Jour. Geol. Soc. London, XLVI, p. 540, Pl. xx, fig. 5.

LENGTH.—1.3 mm. HEIGHT.—0.8 mm.

PLESIOTYPES.—A. M. N. H. Cat. No. 24610.

This specimen resembles very closely that figured by Jones in 1890 from Eighteen Mile Creek, New York, but the orientation has been reversed.

Beyrichiidae Ulrich, 1894 (1897)

CTENOBOLBINA ULRICH, 1890

Ctenobolbina papillosa Ulrich, 1891

Figure 8

ULRICH, E. O., 1891, Jour. Cin. Soc. Nat. Hist., XIII, No. 4, p. 186, Pl. XV, figs. 8 *a–c*.

LENGTH.—1.25 mm. HEIGHT.—0.94 mm.

PLESIOTYPES.—A. M. N. H. Cat. No. 24614.

Well-preserved specimens of this species are common in the Widder Horizon.

TETRADELLA ULRICH, 1890

Tetradella cicatrosa Warthin, 1934

Figure 9

WARTHIN, A. S., 1934, Contrib. Mus. Paleo., Univ. Mich., IV, No. 12, p. 209, Pl. I, figs. 4–6.

LENGTH.—1.28 mm. HEIGHT.—0.78 mm.

PLESIOTYPES.—A. M. N. H. Cat. No. 24615.

The specimens from Arkona consistently show a much more oblique backward swing than do those figured by Warthin from the Michigan Traverse. Their similarity in all other respects leads one to consider them conspecific.

RICHINA, NEW GENUS

GENOTYPE.—*Richina truncata*, new species.

Carapace subovate; hinge line straight; ventral margin convex; ends rounded, anterior end with a backward swing. Right valve overlaps the left. A median sulcus is bounded by nodes, or blunt spines, or a node and a spine. Surface of valve smooth, or very finely punctate, or finely reticulate.

This genus differs from *Ulrichia* in the absence of the marginal ridge, and of the coarsely reticulated surface, and in the overlap of the right over the left valve.

Richina truncata, new species

Figures 5, 5*a*, 6

Carapace subovate; hinge line straight, with obtuse cardinal angles. The posterior one-third of the dorsal margin is obliquely truncated; ventral margin convex; ends rounded, the anterior end with an oblique backward swing. The right valve is slightly larger than the left, overlapping most conspicuously on the posterior and ventral margins. A well-defined submedian sulcus, located slightly anterior to the center of the valve, is bounded anteriorly by a node, and posteriorly by a spine. The

node is located near the central part of the dorsal anterior half of the valve; the spine is located in the line of the maximum height of the valve, just below the dorsal margin. The valves are gently swollen just ventral to the submedian sulcus. Surface of valves is very finely granulated. Greatest height is located about one-third of the length from the posterior end; height of anterior end much less than posterior; greatest convexity anterior to center.

LENGTH.—0.84 mm. HEIGHT.—0.52 mm.

TYPES.—A. M. N. H. Cat. No. 24612 (Fig. 6); A. M. N. H. Cat. No. 24611 (Fig. 5, 5*a*).

Richina subcircularis, new species

Figure 7

Carapace subcircular; hinge line straight, about two-thirds as long as the valve; cardinal angles broadly obtuse. Ventral margin convex; ends rounded, both with the same radius of curvature; very slight backward swing anterior. Right valve overlaps the left on free margins. Well-defined median sulcus is bounded anteriorly by a well-rounded node, and posteriorly by a blunt spine, smaller than the node. Greatest height is posterior to the center, through the spine; greatest convexity is central where the valves swell slightly, ventral to the median sulcus. Surface finely granulated.

LENGTH.—0.85 mm. HEIGHT.—0.6 mm.

TYPES.—A. M. N. H. Cat. No. 24613.

This species differs from *Richina truncata* in having a comparatively greater height in proportion to the length.

Kirkbyidae Ulrich and Bassler, 1906

AMPHISSITES GIRTY, 1910

Amphissites diadematus Van Pelt, 1933

Figure 10

VAN PELT, H., 1933, Jour. Paleo., VII, p. 329, Pl. XXXIX, figs. 8–15.

LENGTH.—1.05 mm. HEIGHT.—0.67 mm.

PLESIOTYPES.—A. M. N. H. Cat. No. 24616.

Several specimens of this species have been found in the Arkona collection.

Amphissites simplicissimus Knight, 1928

Figures 11, 11*a*

KNIGHT, J. B., 1928, Jour. Paleo., II, No. 3, pp. 266, 267, Pl. XXXII, figs. 11 *a–d;* Pl. XXXIV, fig. 6.

LENGTH.—0.4 mm. HEIGHT.—0.28 mm.

PLESIOTYPES.—A. M. N. H. Cat. No. 24617.

This is a rather elongate example of the species.

Amphissites conatus, new species

Figures 12, 12*a*

Carapace subrectangular; hinge line straight; cardinal angles obtuse. Ventral margin broadly convex; ends rounded, anterior with very slight backward swing. Valves apparently equal, with flattened keel along free margins. A conical node lies in a slightly depressed area anterior to the center of the valve, and projects out from the surface just ventral to the dorsal margin. Entire surface is reticulate, with occasional very small spinose papillae. Greatest convexity is central; greatest height is about one-third the length from the posterior margin; but the rest of the height does not vary much from this.

LENGTH.—0.5 mm. HEIGHT.—0.33 mm.

TYPES.—A. M. N. H. Cat. No. 24618.

KIRKBYELLA CORYELL AND BOOTH, 1933

Kirkbyella unicornis, new species

Figure 13

Carapace subrhomboidal; hinge line straight, almost equal in length to the length of the carapace. Cardinal angles slightly obtuse; ventral margin straight with ends rounded; extremities of valve gently convex. Sulcus with small circular pit at base, slightly posterior to the middle of the valve. Small blunt spine near the anterior end of the carapace, about one-fourth of the height above the ventral margin; a very inconspicuous ridge-like elevation extends from this for a short distance towards the posterior. Entire surface is reticulated. Height of valves nearly uniform for central three-quarters; convexity fairly uniform throughout.

LENGTH.—0.72 mm. HEIGHT.—0.38 mm.

TYPES.—A. M. N. H. Cat. No. 24619.

Thlipsuridae Ulrich, 1894 (1897)

STREPULITES, NEW GENUS

GENOTYPE.—*Strepulites mooki*, new species.

Valves reniform or subovate, unequal; right valve larger. Dorsal margin convex; ventral margin concave centrally or straight; ends of valves rounded. Valves ornamented by narrow ridges somewhat paralleling the margins.

Octonaria quadricostata Van Pelt and *O. crescentiformis* Van Pelt are included in this genus.

Strepulites mooki, new species

Figure 14

Valves reniform, unequal, right valve overlapping the left on the entire margin. Dorsal margin convex; ventral margin concave centrally becoming convex toward the ends; end margins rounded. Ventral contact with slight central sinuosity. Contact is formed by a ridge in the left valve which fits into a groove in the right. Carapace ornamented by a pair of ridges irregularly parallel to each other and to the anterior, dorsal, posterior, and a small portion of the ventral-posterior margins. The ends of the ridges are united by a longitudinal ridge lying in the ventral half of the valve which slopes upward toward the posterior border until the posterior ridge is

reached. Greatest height and convexity are located in the posterior half; greatest length central, parallel to the ventral margin.

LENGTH.—1.08 mm. HEIGHT.—0.59 mm.

TYPES.—A. M. N. H. Cat. No. 24626.

Ropolonellidae, new family

This family includes straight-hinged, subtriangular Ostracoda, with more or less ornamented carapaces; the right valve appears to be usually larger than the left. Contact of valves rabetted; ridge in the left valve fits into a groove in the right.

ROPOLONELLUS Van Pelt, 1933

Ropolonellus papillatus Van Pelt, 1933

Figure 15

VAN PELT, H., 1933, Jour. Paleo., VII, No. 3, p. 339, Pl. XXXIX, figs. 29, 30.

Carapace subtriangular; hinge straight; ventral margin converges towards dorsal margin anteriorly. Anterior end with several small spinose papillae on thickened area of projecting margin. Papillose spines project from the posterior marginal ridge also. Right valve overlaps left on entire margin. Contact rabetted.

LENGTH.—0.70 mm. HEIGHT.—0.40 mm.

PLESIOTYPES.—A. M. N. H. Cat. No. 24620.

RUDDERINA, NEW GENUS

GENOTYPE.—*Rudderina extensa,* new species.

Carapace suboblong; hinge line straight, of the ridge and groove type; ventral margin nearly straight to slightly convex, rounded where it joins the extremities; end margins of valves somewhat irregularly rounded in lateral view. Right valve overlaps the left on entire margin. Anterior and posterior of one or both valves extended, near the ventral margin into spines. Greatest height and thickness located about one-fourth of the length from the posterior end. Anterior height about two-thirds of the posterior height.

Rudderina extensa, new species

Figure 16

Carapace suboblong; hinge straight; ventral margin slightly convex near the ends and concave centrally; sharply rounded where it joins the extremities; end margins of valve rounded, the posterior more broadly than the anterior. Cardinal angles gently obtuse. Right valve overlaps the entire margin of the left valve, with overlap greatest on ventral edge; contact rabetted. Anterior and posterior of both valves extended near the ventral margin into prominent spines. Surface of valves finely papillose with some scattered larger granules, more abundant in the anterior half. Greatest height and convexity are located about one-fourth of the length from the posterior end. Anterior height about two-thirds of the posterior height. A gentle ridge like swelling, with an adjacent shallow sinus is observable, extending from the posterior extremity of the hinge, downward and forward, and disappearing in the area of maximum convexity near the ventral border.

LENGTH.—0.93 mm. HEIGHT.—0.45 mm.
TYPES.—A. M. N. H. Cat. No. 24625.

EUGLYPHELLA WARTHIN, 1934

Euglyphella sigmoidalis (Jones), 1890

Figure 17

Strepula sigmoidalis JONES, 1890, Geol. Soc. London, Quart. Jour., XLVI, p. 11, Pl. II, fig. 4.

Euglyphella sigmoidalis WARTHIN, A. S., 1934, Contr. Mus. Paleo., Univ. Mich., IV, No. 12, p. 220, Pl. I, fig. 21.

Carapace ornamented by characteristic sigmoid branching carinae, with a row of papillae projecting from the anterior end. Right valve overlaps left on entire margin and is grooved to receive the left.

LENGTH.—1.02 mm. HEIGHT.—0.63 mm.
PLESIOTYPES.—A. M. N. H. Cat. No. 24621.

Euglyphella projecta, new species

Figure 18

Carapace subrhomboidal; dorsal and ventral margins straight, and converging anteriorly; posterior end broadly rounded; anterior acutely extended. Valves ornamented by the outer and inner looped carinae apparently more elongate and narrow than in the other species, with the ridges joining anteriorly. The lower tangential juncture extends anteriorly in a sharp and high ridge that approximately parallels the anterior margin, raised almost to spine-like proportions. This joins the dorsal ridges. This species has the free margins produced, anteriorly and posteriorly into narrow marginal flanges. The anterior flange is broader than the posterior. The coarse reticulations are few and inconspicuous in the area surrounded by the loops. The larger right valve is grooved to receive the margins of the smaller left valve.

LENGTH.—0.83 mm. HEIGHT.—0.46 mm.
TYPES.—A. M. N. H. Cat. No. 24622.

Euglyphella compressa, new species

Figure 19

Carapace subtriangular; hinge line straight; dorsal margin arcuate; ventral margin straight, convex where it joins posterior end, and slightly angular at the junction. Anterior end is flanged and spinose. The posterior height is nearly three times the anterior height. Valves quite convex, compressed just inside of the anterior marginal flange. Surface carinated with an outer and an inner loop; the outer one approximately parallels the dorsal, posterior and part of the postero-ventral margins; the ventral limb of the inner loop joins the ventral limb of the outer carina tangentially; and the dorsal limb of the inner loop curves to meet the dorsal limb of the outer one, leaving the inclosed area apparently open antero-ventrally. The area between the loops and the interior of the inner loop is coarsely reticulate. A single spine is present on the dorsal carina at the anterior end. Right valve is larger than left, and is grooved to receive the margins of the left valve.

LENGTH.—1.05 mm. HEIGHT.—0.55 mm.
TYPES.—A. M. N. H. Cat. No. 24624.

Euglyphella jenningsi, new species

Figure 20

Carapace ovate; hinge straight, with slightly arcuate dorsal margin extending above the hinge line. Ventral margin concave centrally and somewhat so anteriorly, convex posteriorly; the anterior margin is truncated so that it joins with the dorsal and ventral margins in an angular manner. Right valve is larger than the left and is bordered by a marginal ridge; right valve is grooved to receive the left. Valves are ornamented by the outer and inner loops, the inner loop widely open antero-ventrally, and the outer loop quite inconspicuous in the postero-dorsal region. The inclosed area between the loops appears open anteriorly where the ridges rise into spines. Coarse reticulations in two rows of irregular sized depressions cover the anterior and posterior ventral portions of the inclosed area; the dorsal posterior portion contains a larger depression that includes several smaller ones.

LENGTH.—0.89 mm. HEIGHT.—0.54 mm.

TYPES.—A. M. N. H. Cat. No. 24623.

BUFINA, NEW GENUS

GENOTYPE.—*Bufina elata*, new species.

Carapace subovate; dorsal margin straight; ventral margin convex; ends rounded, anterior end with a backward swing. Surface is ornamented by two anterior spines and a posterior ridge, paralleling the posterior margin. Small papilla-like spines may or may not be present on the end margins. Contact of valves rabetted; right valve larger than left.

Moorea bicornuta Ulrich, 1891, is included in this genus.

Bufina elata, new species

Figure 22

Carapace subovate; dorsal margin straight; cardinal angles obtuse; ventral margin angularly convex, with greatest extension just posterior to the center. Ends rounded, anterior more blunt than posterior; anterior with slight backward swing. Contact of the valves is finely toothed; ridge in left valve fits into groove in right. Surface ornamented by two blunt anterior spines that project outward and forward, and a prominent, narrow, posterior ridge, near to and approximately paralleling the posterior margin. A shallow depression lies within the crescent of, and anterior to, the ridge. Numerous tiny spines project from the posterior margin. Greatest height is just posterior to the center; greatest convexity about central; greatest length midway between the dorsal and ventral margins.

LENGTH.—0.78 mm. HEIGHT.—0.53 mm.

TYPES.—A. M. N. H. Cat. No. 24629.

Bufina elata is shorter and higher than *Bufina bicornuta* (Ulrich), with the location of the greatest length lower than in *B. bicornuta*. In *B. elata* the anterior end is higher than the posterior; the reverse is true of Ulrich's species.

Bufina elongata, new species

Figure 21

Carapace elongate, ovate; dorsal margin straight; anterior cardinal angle gently obtuse; posterior cardinal angle more obtuse than anterior. Ventral margin oblique slightly convex; ends rounded, anterior with oblique backward swing; posterior end extended near the ventral border. Surface ornamented by two blunt anterior spines and a submarginal posterior ridge. Right valve larger than left; contact rabetted. Greatest height is located one-fourth of the length from the posterior margin; greatest convexity central; greatest length below the median line.

LENGTH.—0.85 mm. HEIGHT.—0.46 mm.

TYPES.—A. M. N. H. Cat. No. 24630.

This species is more elongate, and the greatest height is much farther posterior than in any of the species so far described (*B. elata, B. bicornuta*).

Bairdiidae Sars, 1887

BAIRDIA McCOY, 1844

Bairdia summacuminata, new species

Figure 23

Carapace bairdioid, elongate ovate; ends highly acuminate, curving dorsad, the posterior end more spine-like than the anterior. Dorsal margin high arcuate; ventral margin regularly and broadly convex, except centrally where it is nearly straight. Overlap of left over right valve on entire margin, but most pronounced dorsally. Greatest height and convexity are central. Surface very finely punctate.

LENGTH.—1.44 mm. HEIGHT.—0.65 mm.

TYPES.—A. M. N. H. Cat. No. 24631.

BAIRDITES, NEW GENUS

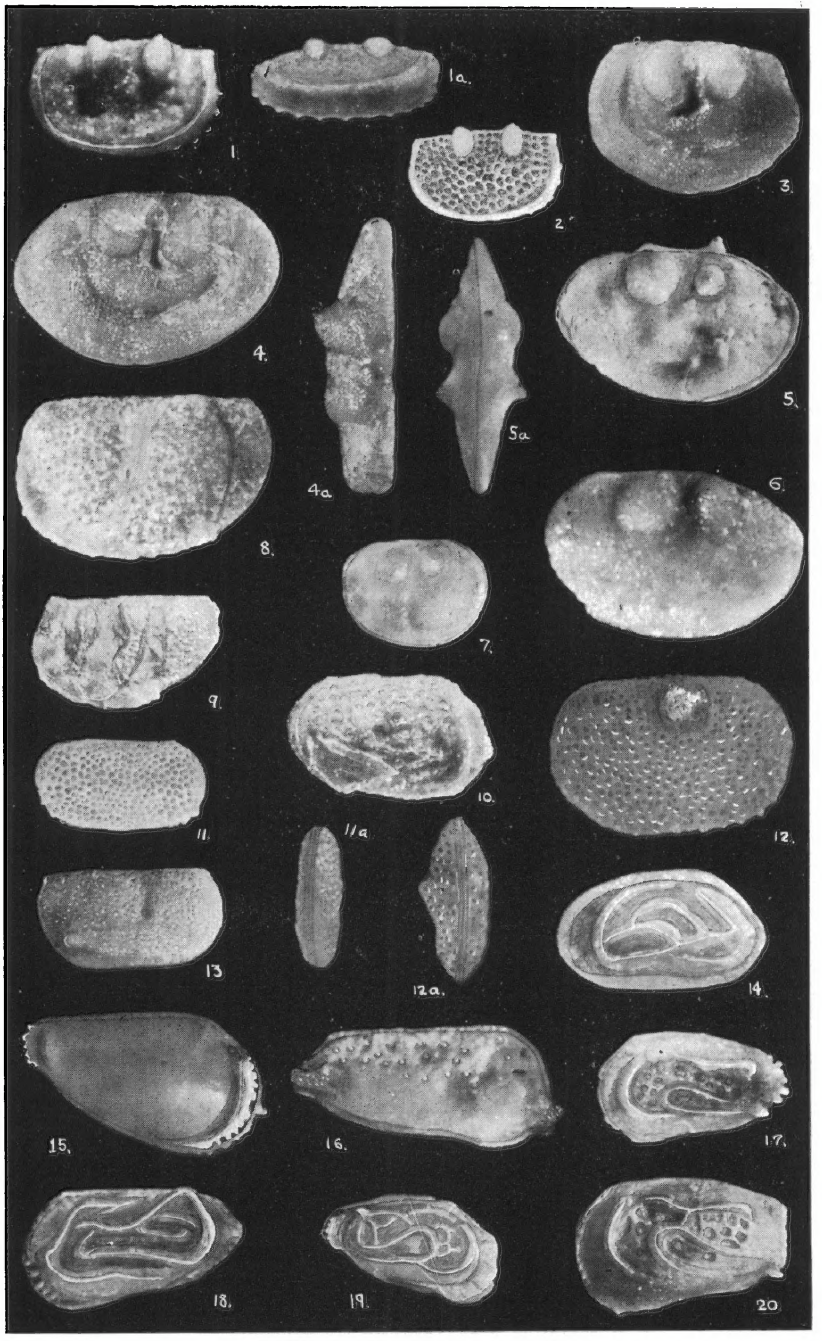
GENOTYPE.—*Bairdites deltasulcata*, new species.

Carapace of characteristic Bairdia shape. This genus is differentiated from *Bairdia* by the presence of a posterior depression, bounded by a semi-circular ridge opening anteriorly.

Bairdites deltasulcata, new species

Figure 24

Carapace subtriangular; dorsal margin highly convex, becoming slightly concave where the posterior two-fifths of the margin slopes to the posterior end. Hinge line straight, located in the posterior half of the valve, equal in length to about one-half the length of the valve; hinge rabetted. Ventral margin straight, or slightly sinuate; anterior end bluntly rounded, with greatest extension below the median line; posterior end acuminate, turning slightly upward. Left valve overlaps right, apparently on all margins. (The type specimen appears somewhat distorted); overlap greatest along the mid-dorsal and ventral regions. About one-fourth of the length from the posterior end of each valve, the surface rises to a small semi-circular ridge, facing anteriorly, with a shallow depression inside the ridge. Greatest height



See opposite page for captions.

(*Captions for Figures 1–20*)

Fig. 1. *Ulrichia spinifera*, n.sp. Left valve. × 35. A.M. No. 24628.

Fig. 1*a*. *Ulrichia spinifera*, n.sp. Ventral. × 25.

Fig. 2. *Ulrichia spinifera*, n.sp. Restoration of surface.

Fig. 3. *Bollia hindei* Jones. Right valve. × 20. A.M. No. 24610.

Fig. 4. *Bollia widderensis*, n.sp. Left valve. × 20. A.M. No. 24627.

Fig. 4*a*. *Bollia widderensis*, n.sp. Dorsal. × 25.

Fig. 5. *Richina truncata*, n.gen., n.sp. Left valve. × 40. A.M. No. 24612.

Fig. 5*a*. *Richina truncata*, n.gen., n.sp. Dorsal. × 40.

Fig. 6. *Richina truncata*, n.gen., n.sp. Another specimen. Left valve. × 40. A.M. No. 24611.

Fig. 7. *Richina subcircularis*, n.sp. Left valve. × 20. A.M. No. 24613.

Fig. 8. *Ctenobolbina papillosa* Ulrich. Right valve. × 25. A.M. No. 24614.

Fig. 9. *Tetradella cicatrosa* Warthin. Right valve. × 20. A.M. No. 24615.

Fig. 10. *Amphissites diadematus* Van Pelt. Left valve. × 25. A.M. No. 24616.

Fig. 11. *Amphissites simplicissimus* Knight. Left valve. × 55. A.M. No. 24617.

Fig. 11*a*. *Amphissites simplicissimus* Knight. Ventral. × 45. A.M. No. 24617.

Fig. 12. *Amphissites conatus*, n.sp. Right valve. × 65. A.M. No. 24618.

Fig. 12*a*. *Amphissites conatus*, n.sp. Ventral. × 45. A.M. No. 24618.

Fig. 13. *Kirkbyella unicornis*, n.sp. Left valve. × 35. A.M. No. 24619.

Fig. 14. *Strepulites mooki*, n.gen., n.sp. Left valve. × 25. A.M. No. 24626.

Fig. 15. *Ropolonellus papillatus* Van Pelt. Left valve. × 45. A.M. No. 24620.

Fig. 16. *Rudderina extensa*, n.gen., n.sp. Left valve. × 40. A.M. No. 24625.

Fig. 17. *Euglyphella sigmoidalis* (Jones). Right valve. × 25. A.M. No. 24621.

Fig. 18. *Euglyphella projecta*, n.sp. Right valve. × 35. A.M. No. 24622.

Fig. 19. *Euglyphella compressa*, n.sp. Left valve. × 25. A.M. No. 24624.

Fig. 20. *Euglyphella jenningsi*, n.sp. Right valve. × 30. A.M. No. 24623.

See opposite page for captions.

(*Captions for Figures 21–38*)

Fig. 21. *Bufina elongata*, n.sp. Right valve. × 35. A.M. No. 24630.

Fig. 22. *Bufina elata*, n.gen., n.sp. Right valve. × 45. A.M. No. 24629.

Fig. 23. *Bairdia summacuminata*, n.sp. Right valve. × 25. A.M. No. 24631.

Fig. 24. *Bairdites deltasulcata*, n.gen., n.sp. Right valve. × 20. A.M. No. 24632.

Fig. 25. *Healdia arkonensis*, n.sp. Right valve. × 35. A.M. No. 24633.

Fig. 26. *Cavellina subplana*, n.sp. Right valve. × 50. A.M. No. 24637.

Fig. 26*a*. *Cavellina subplana*, n.sp. Dorsal. × 30. A.M. No. 24637.

Fig. 27. *Cavellina cuneata*, n.sp. Right valve. × 45. A.M. No. 24636.

Fig. 27*a*. *Cavellina cuneata*, n.sp. Ventral. × 48.

Fig. 28. *Ponderodictya bispinulata* (Stewart). Right valve. × 20. A.M. No. 24638.

Fig. 28*a*. *Ponderodictya bispinulata* (Stewart). Dorsal. × 25.

Fig. 29. *Ponderodictya bispinulata* (Stewart). Another specimen. Right valve. × 20. A.M. No. 24638.

Fig. 30. *Ponderodictya bispinulata* (Stewart). Interior of right valve. × 25. A.M. No. 24638.

Fig. 31. *Ponderodictya unicornis* (Van Pelt). Right valve. × 25. A.M. No. 24634.

Fig. 31*a*. *Ponderodictya unicornis* (Van Pelt). Interior of right valve, showing ventral margin and line of contact. × 25. A.M. No. 24634.

Fig. 32. *Ponderodictya pentacornis*, n.sp. Right valve. × 20. A.M. No. 24635.

Fig. 33. *Birdsallella devonica*, n.sp. Left valve. × 30. A.M. No. 24639.

Fig. 34. *Janetina harrietensis*, n.gen., n.sp. Left valve. × 50. A.M. No. 24643.

Fig. 35. *Jenningsina catenulata* (Van Pelt). Left valve. × 45. A.M. No. 24644.

Fig. 36. *Quasillites obliquus*, n.gen., n.sp. Left valve. × 20. A.M. No. 24641.

Fig. 36*a*. *Quasillites obliquus*, n.gen., n.sp. Dorsal.

Fig. 37. *Spinovina distributa*, n.gen., n.sp. Left valve. × 30. A.M. No. 24640.

Fig. 38. *Quasillites fordei*, n.sp. Right valve. × 30. A.M. No. 24642.

is in the posterior half; greatest convexity nearly central, although the actual greatest thickness is through the ridge crests.

LENGTH.—1.66 mm. HEIGHT.—0.94 mm.

TYPES.—A. M. N. H. Cat. No. 24632.

HEALDIA ROUNDY, 1926

Healdia arkonensis, new species

Figure 25

Carapace ovate; dorsal margin arcuate; ventral margin straight with slight central sinuosity of the ventral contact, rounded where it joins the extremities of the valve; end margins rounded, posterior slightly more broadly than the anterior. Overlap of left valve over right is entire, but greatest on anterior half of dorsal, ventral, and on anterior margins; overlap less prominent on posterior dorsal marginal slope and still less on the posterior margin. Posterior swelling, flush with the surface of the valve on its anterior side, rises to a crescentic ridge terminated by short but prominent backward-pointing spines on its dorsal and ventral extremities. A low inconspicuous vertical ridge, with a very slight depression posterior to it is located near the anterior margin of the right valve, about one-fifth of the length from the anterior end. This is absent or only slightly developed on the left valve. Greatest height central; greatest convexity at the posterior swelling.

LENGTH.—0.91 mm. HEIGHT.—0.54 mm.

TYPES.—A. M. N. H. Cat. No. 24633.

Cytherellidae Sars, 1865

CAVELLINA CORYELL, 1928

Cavellina cuneata, new species

Figures 27, 27*a*

Carapace cuneiform; dorsal margin slightly arcuate, nearly straight, and sloping gently from the anterior cardinal angle towards the posterior end which is lower than the anterior; ventral margin concave centrally, becoming gently convex towards extremities, and sloping up from anterior to posterior. Anterior margin broadly rounded with greatest extension below the mid-length; posterior end rounded acuminate at mid-length. Left valve overlaps the right valve on entire margin. Greatest height is about 1/5 of the length from the anterior margin, decreasing gently and gradually towards the posterior acumination. Greatest convexity is in posterior 1/3 of the valve. The left valve is slightly more convex than the right, but both are very gibbous, so that the convexity is greater than the greatest height of the valves. Convexity decreases abruptly towards posterior margin. Surface of valves smooth.

LENGTH.—0.75 mm. Height.—0.40 mm.

TYPES.—A. M. N. H. Cat. No. 24636.

Cavellina subplana, new species

Figures 26, 26*a*

Carapace subelliptical; dorsal margin slightly arcuate; ventral margin very slightly convex, becoming more rounded towards the rounded extremities; posterior end more highly arcuate than anterior with greatest extension of posterior slightly above the mid-length; greatest extension of anterior end slightly below the mid-

length. Left valve overlaps right on entire margin. Greatest height is located just posterior to the mid-height; greatest convexity in the posterior one-fourth. Convexity is very slight at anterior edge, increasing gradually until about 1/4 of the length from the posterior end where the convexity is almost equal to the height. From here the valves slope rather suddenly to the posterior margin. Convexity of the left valve is greater than that of the right. Surface of valves smooth.

LENGTH.—0.67 mm. HEIGHT.—0.45 mm.

TYPES —A. M. N. H. Cat. No. 24637.

PONDERODICTYA, NEW GENUS

GENOTYPE.—*Ponderodictya bispinulata* (Stewart), 1927.

Carapace ovate; dorsal margin arcuate; ventral margin nearly straight, slightly convex or slightly concave centrally, with convex anterior and posterior terminations. Anterior end lower than posterior; anterior margin broadly rounded with backward swing; posterior margin rounded. Surface of valve reticulate except near the margins; smooth surface widest on the ends. Left valve larger than right. Contact rabetted, of the ridge and groove type.

DISCUSSION.—The genus *Primitiopsis* as figured by Jones in 1887,[1] and in 1888,[2] is a straight-hinged ostracode with an internal shell structure different from that of the new genus here proposed. *Leperditia punctulifera* Hall, 1860,[3] is not figured, and no mention is made of the hinge line. *Primitiopsis punctulifera* (Hall) Jones, 1890,[4] is an ovate, arcuate hinged ostracode which should be removed from the genus *Primitiopsis*, and also placed in another species. *P. punctulifera* (Hall) Jones, 1891,[5] is a straight-hinged ostracode agreeing in general aspect with the genotype *P. planifrons* Jones, 1887. Thus *P. punctulifera* Jones, 1891, is not congeneric with *P. punctulifera* Jones, 1890. *P. unicornis* Van Pelt, 1933, should be removed from the genus *Primitiopsis*.

The specimens of the present study do not show the characteristic overlap of *Cytherella* Jones, 1849, or the internal sculpture of *Cytherellina* Jones and Holl, 1869, so that the species *Cytherella* (?) *bispinulatus* Stewart, 1927, and *Cytherellina punctulifera* (Hall) Warthin, 1934, which are synonymous with *Primitiopsis punctulifera* Jones, 1890, should also be placed in the new genus. The reticulation is so constant and well-defined a character of these forms that it may be regarded, along with the ovate shape, and overlap of the left valve over the right, as a distinctive feature of the genus. For these reasons it is proposed to set up the genus *Ponderodictya* to include the arcuate-hinged, inequivalved,

[1] Jones, T. R., 1887, Silur. Ostrac. Gothland, p. 5. Figures copied in Maryland Geol. Sur. Silur., p. 300, Fig. 15, 1925 (Genotype.—*Primitiopsis planifrons* Jones).
[2] Jones, T. R., 1888, Ann. Mag. Nat. Hist., (6) I, p. 406, Pl. XXII, fig. 18 (*Primitiopsis planifrons*).
[3] Hall, J., 1860, Thirteenth Report, Regents Univ. State of N. Y., p. 92.
[4] Jones, T. R., 1890, Quart. Jour. Geol. Soc. London, XLVI, p. 9, Pl. II, figs. 7, 12, 13.
[5] Jones, T. R., 1891, Contrib. Micro-Pal., Canada Geol. Sur., III, p. 95, Pl. XI, figs. 10, 11.

reticulate ostracoda, so prevalent in the Hamilton formations of Ontario, Michigan, Ohio, and New York.

Ponderodictya bispinulata (Stewart), 1927

Figures 28, 28*a*, 29, 30

Primitiopsis punctulifera Jones, 1890, Quart. Jour. Geol. Soc. London, XLVI, p. 9, Pl. II, figs. 7, 12, 13 (non Jones, 1891; non *Leperditia punctulifera* Hall, 1860).

Cytherella (?) *bispinulatus* Stewart, 1927, Geol. Sur. Ohio Bull., XXXII, p. 60, Pl. V, figs. 18, 19.

Cytherellina punctulifera (Jones) Warthin, 1934, Contrib. Mus. Paleo., Univ. Mich., IV, No. 12, p. 222, Pl. I, figs. 24, 25.

Carapace ovate; dorsal margin convex; ventral margin straight with central sinuosity in ventral contact; convex at extremities. Posterior margin rounded; anterior margin broadly rounded with backward swing, and lower than posterior. Left valve overlaps right on all margins, with overlap most pronounced ventrally. A ridge near the margin of the right valve fits into a groove in the left. Surface of valve reticulate, with a less ornamented spot just anterior to the center of the valve. Anterior and posterior without reticulations. Two small nodes or spines, the ventral one more prominent, project near the posterior end, from the surface of the convexity, at the crest of the posterior dorsal and posterior ventral slopes. Near the anterior end is a low, non-reticulate, curved ridge, more prominent in the right valve and in some specimens apparently lacking in the left. Greatest height is located about one-third of the length from the posterior end, with convexity greatest near the center of the posterior half of the valve.

Length.—1.33 mm. Height.—0.88 mm.

Plesiotypes.—A. M. N. H. Cat. No. 24638.

Note.—The species *Leperditia punctulifera* Hall, 1860 remains as the type of the species *Primitiopsis punctulifera* (Hall) Jones, 1891. Though not described as such, the hinge-line of *L. punctulifera* should be straight, since *Leperditia* is a straight-hinged form, and since Hall described the overlap as being only ventral.

Ponderodictya unicornis (Van Pelt), 1933

Figures 31, 31*a*

Primitiopsis unicornis Van Pelt, 1933, Jour. Paleo., VII, No. 3, p. 326, Pl. XXXIX, figs. 23–28.

Carapace ovately rounded; similar to *Ponderodictya punctulifera*, but with a single posterior ventral spine.

Length.—1.53 mm. Height.—0.88 mm.

Plesiotypes.—A. M. N. H. Cat. No. 24634.

Ponderodictya pentacornis, new species

Figure 32

This species resembles the other members of this genus, but the valves are slightly less convex, and there are three additional nodes, one near the anterior end and one

near the posterior end, just above the ventral margin; and one on the dorsal end of the anterior ridge. Posterior from the anterior ridge, the surface of each valve is depressed.

LENGTH.—1.43 mm. HEIGHT.—0.87 mm.

TYPES.—A. M. N. H. Cat. No. 24635.

BIRDSALLELLA CORYELL AND BOOTH, 1933

Birdsallella devonica, new species

Figure 33

Carapace cytherelloid; dorsal margin arcuate, ventral margin with central sinuosity; anterior sharply arcuate; posterior more broadly rounded The surface near the anterior end descends almost vertically from a low ridge which parallels the anterior margin. Convexity of the valves is slight.

LENGTH.—0.88 mm. HEIGHT.—0.51 mm.

TYPES.—A. M. N. H. Cat. No. 24639.

SPINOVINA, NEW GENUS

GENOTYPE.—*Spinovina distributa,* new species.

Carapace cytherelloid; hinge straight, channelled. Right valve overlaps left, with grooved contact in right valve to receive the ridge of the smaller left valve. Surface marked by fine longitudinal ridges. An anterior ventral spine projects forward from the crest of the anterior slope of the convexity. A median spot free from ornamentation is present near the center of the valve.

Spinovina distributa, new species

Figure 37

Carapace ovate; hinge straight, deeply channelled, about one-half as long as the entire shell. Dorsal margin arcuate, ventral margin nearly straight, with curved extremities, more broadly rounded where it joins the posterior margin. Ends rounded, anterior end with distinct backward swing, and higher than posterior end. Right valve is larger than the left, overlapping on entire margin, with overlap much less pronounced dorsally; contact rabetted. Surface marked by fine longitudinally distributed ridges, bifurcating mostly along the median line, diverging anteriorly. Posterior convexity of the valves is elevated near the margin into a ridge-like swelling at the crest of the steep posterior slope. An anterior ventral spine projects forward from the crest of the steep smooth anterior slope. A less distinctly ornamented spot is present near the center of the shell. Greatest height is slightly anterior of center.

LENGTH.—1.02 mm. HEIGHT.—0.55 mm.

TYPES.—A. M. N. H. Cat. No. 24640.

Quasillitidae, new family

Subovate to subrhomboidal ostracodes with straight dorsal margin. Right valve larger than left. Surface of carapace pitted or finely grooved and ridged. A clear muscle spot or pit is usually present near the center of the valve.

Besides the genera described under this family, *Graphiodactylus* Roth should be included here.

QUASILLITES, NEW GENUS

GENOTYPE.—*Quasillites obliquus*, new species.

Carapace subovate to rhomboidal; hinge line straight. Ventral margin straight to gently convex. Right valve larger than left, with a grooved contact to receive the left valve. Surface of valves is marked by fine longitudinal ridges and grooves, bifurcating along a median line, and diverging slightly anteriorly. A less ornamented median spot is usually discernible. Posterior convexity is generally elevated into a ridge-like surface at the crest of the steep posterior slope. A spine projects forward from the anterior ventral region, at the crest of the anterior slope.

This genus is differentiated from *Graphiodactylus* Roth by the presence of the steep anterior and posterior slopes, the ridge-like elevation of the posterior convexity, the ornamentation, and the anterior ventral spine. It also lacks the anterior dorsal nodes characteristic of the genus *Graphiodactylus*. *Spinovina*, new genus, is differentiated from *Quasillites*, chiefly because of the ovate outline of the carapace and the deeply channelled hinge of *Spinovina*.

Barychilina rhomboidea (Jones), 1890, and *Barychilina walcotti* (Jones), 1890, should probably be included in this genus.

Quasillites obliquus, new species

Figures 36, 36*a*

Carapace oblique rhomboidal; hinge line straight, partly covered by the overlap of the right valve in the posterior portion. Cardinal angles obtuse, the posterior larger than the anterior. Ventral margin straight, with broadly curved extremities. Anterior end narrowly rounded in the upper half, with an oblique backward swing in the lower half; posterior end narrowly curved in the lower half, and truncated dorsally. Surface marked by faint longitudinal lines typical of the genus, bifurcating from a median line along the crest of the convexity and diverging anteriorly. A very insignificant posterior ridge is present at the crest of the short steep posterior slope of the surface of the valve; a prominent antero-ventral spine projects forward from the crest of the slope where the convexity of the valve dips steeply to the anterior margin. A less ornamented median area is present near the center of each valve. Right valve overlaps the left on free margins and on part of dorsal margin; right valve is grooved to receive the free margins of the left valve. Greatest convexity is located near the center of the anterior half; height practically uniform throughout; dorsal and ventral margins are parallel.

LENGTH.—1.10 mm. HEIGHT.—0.55 mm.

TYPES.—A. M. N. H. Cat. No. 24641.

Quasillites fordei, new species

Figure 38

Carapace suboblong; hinge line straight; ventral margin straight except where it curves to meet the rounded ends of the valves; anterior end almost straight, with backward swing, height about two-thirds as great as the posterior end; anterior cardinal angle slightly obtuse; posterior cardinal angle greater than anterior; great-

est extension of posterior margin is near ventral edge. Surface of valves is covered by fine ridges, an outer set paralleling the outer margins of the valve, and the two inner sets each roughly concentric in the anterior and posterior halves of the valve and converging towards an indefinite transverse cincture which extends from the dorsal to the ventral margin a little posterior to the center of the valve. The fine ridges are connected, rarely, by very thin dissepiment-like cross bars. A poorly defined central spot is present. A small spine projects forward from the antero-ventral region, close to the margin. Surface of valves slopes very gradually to the anterior edge; the posterior surface is slightly more convex than the surface of the anterior half, and the slope to the posterior margin is more abrupt with a slight swelling at the crest of this slope. Greatest height is located about one-fourth of the length from the posterior margin.

LENGTH.—0.68 mm. HEIGHT.—0.40 mm.

TYPES.—A. M. N. H. Cat. No. 24642.

JANETINA, NEW GENUS

GENOTYPE.—*Janetina harrietensis*, new species.

Carapace subrhomboidal; hinge line straight. Right valve overlaps left on free margins. A deep round pit is present near the center of the valve. Surface of carapace is ornamented by small pits which are aligned, on the outside slopes of the valve in a roughly concentric arrangement.

Janetina harrietensis, new species

Figure 34

Carapace subrhomboidal; hinge line straight; anterior cardinal angle rounded obtuse; posterior cardinal angle approximately 90 degrees; ventral margin with slight central sinuosity; extremities slightly rounded, but posterior margin is almost straight. Right valve overlaps left on free margins. A shallow sulcus slightly posterior to the center of the valve extends ventrad from the dorsal margin to a deep round pit just above the mid-length. The convexity of the valve rises slightly on the anterior and ventral edges of the pit. Surface of valve is covered by small pits, which give place, on the slopes of the valve near the margins, to a roughly concentric alignment. Greatest height is through the posterior cardinal angle. Convexity is very slight in posterior, increasing gradually towards the anterior until it is greatest about one-fourth of the length from the anterior end. From here the surface slopes steeply to the margin. Greatest convexity is equal to about two-thirds of the greatest height.

LENGTH.—0.75 mm. HEIGHT.—0.45 mm.

TYPES.—A. M. N. H. Cat. No. 24643.

JENNINGSINA, NEW GENUS

GENOTYPE.—*Jenningsina catenulata* (Van Pelt), 1933.

Carapace subreniform; hinge line straight. Surface of valve covered with fine ridges diverging from a median line. These ridges are connected by cross bars at intervals slightly larger than the space between two ridges, thus producing in effect rows of elongate reticulations. In the center of the valve is a small circular pit. Right valve overlaps the left on free margins.

Jenningsina catenulata (Van Pelt), 1933

Figure 35

Graphiodactylus catenulatus VAN PELT, 1933, Jour. Paleo., VII, No. 3, p. 333, Pl. XXXIX, figs. 31, 32.

Carapace subreniform; hinge line straight, about two-thirds as long as the carapace; cardinal angles not sharply obtuse, the posterior angle greater than the anterior. Ventral margin gently concave, rounding into the curved end margins; anterior end truncated and flattened; posterior end curved with high arc, with greatest extension just below the median line. Surface of valve covered with fine ridges, diverging from a median line at about 30 degrees in the ventral half of the valve and about 45 degrees in the dorsal half. These ridges are connected by cross bars at regular intervals slightly larger than the space between two ridges, thus producing a row of elongate reticulations. Small circular pit in center of valve. Towards the anterior one-fourth of the surface the ridges tend to become parallel. Greatest height is located about one-fourth the length from the posterior margin; greatest convexity just inside the anterior margin; the surface of the valve rises gradually from the posterior to the anterior and drops abruptly to the anterior contact. Right valve overlaps left on free margins.

LENGTH.—0.55 mm. HEIGHT.—0.32 mm.

PLESIOTYPES.—A. M. N. H. Cat. No. 24644.